shield extension member 127. This unique method of assembly is particularly advantageous in that it allows for zero defects on the nose portion of guard 128 which translates into less hang up of the nose portion on tissue upon insertion of trocar assembly 100. For example, FIGs. 20A and 20B illustrate a comparison of the distal end portions of presently disclosed trocar assembly 100 and an existing trocar assembly design. The trocar design shown in FIG. 20B illustrates a circular opening labeled as "A" at the distal end. This opening enables a gap to exist between the knife blade and the opening upon initial insertion of the trocar assembly into a patient, thereby permitting hang-ups of the opening on tissue to occur. The presently disclosed trocar assembly 100 reduces the likelihood of such hang-ups by utilization of the "dolphin nose" design to eliminate the large gaps between the guard element and the knife blade. As an additional feature, either guard member 128 and/or knife blade 125 may be provided with a hydrophillic coating to further reduce the insertion force required to insert trocar assembly 100.

As shown in FIGs. 20-22, the geometries of and cooperation between knife blade 125 and guard member 128 facilitate ease of insertion of modular trocar system 100 through a patient's body wall while maintaining surgeon control and, by reason of spring biased guard 128, provide an enhanced margin of safety to internal organs. Cutting surfaces 186, 188 are extendable beyond the slot 195 formed in guard 128. The knife tip portion defines a planar triangular shape. The knife tip portion may initially be generally formed by stamping or metal injection molding and the cutting edges 186, 188 finely sharpened on both sides of knife blade 125, for example, by machining and/or polishing of the surfaces. Cutting surfaces 186, 188 preferably extend radially outwardly to just within the outer diameter of the cylindrical portion of guard member 128, thereby achieving an incision which approximates the diameter of guard member 128. By incising to the diameter of guard member 128, the force required for inserting modular trocar system 100 through tissue, such as the patient's abdominal wall, is reduced.

For larger diameter trocar assemblies, each of the components of obturator assembly 110 are the same except a larger sized knife blade and guard member are attached to knife rod 170. Also, a larger cannula is attached to the cannula body. This interchangeability of different sized knives and guard members with standard sized components located proximally thereof obviates the need to manufacture and inventory both the components and whole units of non-modular, conventional trocar systems. In particular, the more complex and, therefore, more expensive size-specific elements located in the obturator housing need not be manufactured and inventoried. The manufacturer or distributor need only assemble the appropriate sized knife and guard member with the otherwise standard sized control components as demand dictates.

Referring now to FIGS. 1 in conjunction with and 25-28, cannula assembly 112 of modular trocar system 100 includes a molded cylindrical base portion 216 having transversely extending grip portions 218 formed to extend form an annular flange formed at the proximal end of cylindrical base 216. A series of slots 222 are formed along the underside or distal side of grips 218. A similar modular cannula assembly is disclosed in U.S. Patent 5,807,338 to Smith et al., the entire contents of which are hereby incorporated by reference. It is also contemplated, that either cannula base portion 216 or cannula 116 or both may be formed of transparent or translucent material.

Slots 222 are particularly advantageous in two respects. First, in assembling cannula assembly 112, there are three basic principle components: cylindrical base portion 216 having outwardly directing finger grips 218, a duck bill valve element 224 having a flange 226 which is configured and dimensioned to rest on annular flange 220 of cylindrical base portion 216 and a cannula housing cover portion such as proximal housing element 228 which is configured and dimensioned to rest on duck bill flange 226 and within the outwardly directed finger grips 218. It has been found that by coring out the underside of outwardly extending finger grips 218 with parallel slots 222, molding sinks which had been previously forming on the proximal side of outwardly extending fingers 218 of cylindrical base portion 216 were significantly reduced, thereby providing

a much more reliable flat surface, as best shown in FIG. 18, against which duck bill flange 226 may rest and against which the upper or proximal housing element 228 may be welded.

This greater cooperation between the two cannula housing elements reduces the force which must be applied as between the two housing elements during the welding process, thereby reducing the likelihood that the duck bill valve 224 will be torqued. Torquing of the duck bill valve 224 can potentially reduce the sealing function of the element in the absence of a surgical instrument inserted therethrough.

The second respect in which slots 222 are advantageous is that on the underside of the cylindrical base portion 216 is normally the place where the user grips the cannula the cylindrical base portion 216. Accordingly, the slots provide an improved gripping surface to the user.

A further feature of cannula assembly 112 is the provision of a detachable cannula 116 which readily connects and disconnects from cylindrical base portion 216. Cannula 116 is preferably molded with a substantially constant inner and outer diameter. However, cannula 116 preferably includes a slightly larger inner diameter at its proximal end, e.g., of 2-3 cms length, to facilitate introduction of instrumentation, and a tapered outer diameter at its distal-most portion, e.g. over the distal-most 2-3 cms of length, the tapered outer diameter being largest at a proximal end thereof and smallest at a distal end thereof. In this way, molding is facilitated while penetration force is minimized by reducing the outer diameter of cannula 116 in the region where tissue first makes contact and by providing a gradual taper to the outside diameter to assist in dilation of tissue as it passes proximally along the outer wall of cannula 116.

An elastomeric O-ring may be interposed between cylindrical base portion 216 and cannula 116 to maintain a fluid-type seal between cannula 116 and cylindrical base portion 216. Cannula 116 is formed of a predetermined diameter so as to form a longitudinal throughbore 232 in communication with a passageway formed through cylindrical base portion 216 and proximal housing element 228. Cannula 116 is further provided with an annular flange 234 which is particularly sized to be received in the